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PATENT

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APPLICATION FOR PATENT

ON

GREATER CAPACITY CUTTING SAW

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GREATER CAPACITY CUTTING SAW

CROSS REFERENCE

[0001] The present application claims priority under 35 U.S.C. §119(e) to United States Provisional Patent Serial Number 60/427,647, entitled: *Greater Cutting Capacity Saw*, filed on November 19, 2002, which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention generally relates to the field of electric powered saws, and particularly, to a miter saw having a greater cutting capacity.

BACKGROUND OF THE INVENTION

[0003] Miter saws perform woodworking tasks such as sawing molding. The miter saw has a base and a supporting structure for the cutting blade. The supporting structure may bevel, pivot, and/or slide the cutting blade in operation. Current miter saws have a limited versatility in cutting ability. It has been a long felt need within the woodworking industry to achieve greater cutting capacity with miter saws.

[0004] Various solutions have been implemented to improve the cutting capacity of miter saws; however, miter saw cutting capacity have been limited by cutting blade supporting structure characteristics, such as the placement of the center point of the cutting blade with respect to a fence, the shape and orientation of a gearbox assembly that drives the rotary blade of the miter saw, the length of a pivotable supporting arm, the amount of exposure of the back blade, and the height of the pivot point of the pivotable supporting arm.

[0005] It would be desirable to provide a miter saw having a greater cutting capacity for woodworking.

SUMMARY OF THE INVENTION

[0006] Accordingly, the present invention is directed to a greater capacity cutting saw that overcomes the deficiencies of the prior art. Advantages of the present invention include the exposure of a greater portion of the back of the cutting blade and the placement of the cutting blade in a more forward position with respect to the fence position.

[0007] In a first aspect of the present invention, the center point of the cutting blade of the miter saw is located closer to the miter base. A greater cutting capacity is achieved by using a blade supporting structure that is positioned farther forward from the fence and is pivoted from a higher pivot point than conventional miter saws.

[0008] In a second aspect of the present invention, a motorized gearbox is oriented, shaped, and displaced in a manner that exposes more at the back of the cutting blade to cut shaped molding. The gearbox may be thinned proximate to the rotary point of the saw blade to provide greater clearance from the item being cut. A blade guard is also reduced in size to permit more of the back blade to penetrate an item to be cut.

[0009] In a third aspect of the present invention, the center point of the cutting blade of the miter saw is offset from the saw blade supporting arm. The offset exposes more of the back portion of the cutting blade for cutting operations.

[0010] In a fourth aspect of the present invention, the relationship of the center point of the cutting blade is expressed as an angular measurement between the pivot point of the support arm, the rotary point of the cutting blade, and a horizontal plane that includes the pivot point and is parallel to the miter base.

[0011] It is to be understood that both the forgoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the

invention as claimed. The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate an embodiment of the invention and together with the general description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying figures in which:

FIG. 1 is a side view of an embodiment of the present invention showing a miter saw in a maximum depth cutting position;

FIG. 2 is a side view of an embodiment of the present invention showing a miter saw in a release (or resting) position;

FIG. 3 is a frontal view of an embodiment of the present invention in which a motorized gearbox is attached to the side of the miter saw blade;

FIG. 4 is a side view of an embodiment of the present invention with a safety guard actuated by a lever mechanism;

FIG. 5 is a side view of an embodiment of the present invention in which the miter saw is cutting through crown molding; and

FIG. 6 is a perspective view of the embodiment of FIG. 5.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Reference will now be made in detail to the presently preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings.

[0014] The present invention relates to a greater cutting capacity miter saw (or, chop saw). The increased cutting capacity is accomplished by moving the blade forward of the item to be cut, allowing the center of the blade to be positioned farther forward from the fence, and exposing more of the back blade during the cutting operation. Structural and operational features of the greater capacity cutting miter saw blade are described below.

[0015] Referring now to FIG. 1, an embodiment of the miter saw 10 of the present invention in a maximum depth cutting position through an item 500 is shown. The miter saw includes a base 20 and a supporting structure for the rotary cutting blade 80. (A portion 82 of rotary cutting blade 80 is shown as extending through a slot in the miter saw base 20.) The miter saw base 20 substantially extends in two perpendicular directions. Extending from the rear to the front of the base is a center slot that allows passage of a portion of the saw blade through the base to ensure the item is fully cut. The shape of the base preferably is substantially circular, but may be substantially rectangular or of another suitable form. The base 20 preferably is securable to a work platform to ensure accuracy of the cutting operation and to protect the user from injury. The base 20 may be weighted to prevent unwarranted movement and to better stabilize the saw during operation when it may not be practical to secure the base 20 to a work platform. All or part of the base 20 is preferably formed of a lightweight metal such as aluminum, but may be formed of other metals or alloys, including steel. A housing 30 may be rigidly attached to the base 20. The housing 30 may have a notably greater height than the miter base 20 and may be used to secure attachments to the miter base 20, such as the supporting structure.

[0016] The supporting structure includes two supporting arms, a gearbox, and a handle, as well as the saw blade. The first supporting arm 40 for the saw blade 80 may be secured to the housing 30 or may be directly secured to the rear of the miter base 20. The first supporting arm 40 is preferably capable of being beveled or may be rigidly fixed. Tubes, solid beams, and parallel bars are examples of the variety of structures that may be used to form the first supporting arm 40. The first supporting arm 40 is preferably formed of steel, but may be formed of any suitably strong, durable, and rigid material, such as a different alloy, a single metal, plastic, and the like. With a bevel design, the first supporting arm 40 is preferably secured to a rotary shaft that mounts within the housing 30. A latch mechanism is preferably employed to secure the first supporting arm 40 at a desired bevel. At the top of the first supporting arm, a pivot point 50 is disposed.

As an example, the pivot point 50 may be a bolt mounted within a hole formed in the first supporting arm 40.

[0017] The second supporting arm 60 for the saw blade is pivotably secured to the first supporting arm 40 at the pivot point 50 and swivels through manual control. Frictional contact at the pivot point 50 may provide retentive positioning for the cutting blade 80. The second supporting arm 60 is longer than similar arms found in prior art devices. This increased arm length helps the miter saw of the present invention achieve a greater cutting capacity.

[0018] Proximate to the distal end of the second supporting arm 60 is a mounting structure for the rotary blade 80. The distal end of the second supporting arm 60 may be offset from the rotary point 70 so as to increase the cutting capacity by exposing more of the back blade or may be placed at the same level as the rotary point.

[0019] Certain parameters may be used to describe operationally and/or physically inventive features of the present invention. These parameters may include the minimum perpendicular displacement (OFFSET) from the near edge or an imaginary extension of the near edge of the distal end of the support arm 60 to the rotary point 70 and/or the difference in vertical height (HGT DIFF) between the pivot point 50 of the second supporting arm 60 and the rotary point 70 of the cutting blade in the maximum cutting capacity position. The size of the offset (OFFSET) may vary, depending upon the application, and may be 1, 2, 3, 4, or more inches. Alternatively, the offset (OFFSET) may measure the minimum perpendicular distance between the centerline or centerline extension of the second supporting arm 60 and the rotary point 70. The vertical height difference, HGT DIFF, may be 1, 2, 3, 4, or more inches, when the cutting blade is positioned at the maximum cutting capacity. In certain applications, at the maximum cutting capacity, the rotary point 70 may be at the same level as or slightly higher than the pivot point 50. Instead of using the rotary-point-to-pivot-point height difference

(HGT DIFF), the angular relationship α of an imaginary line drawn from the pivot point 50 of the second supporting arm to the rotary point 70 with respect to a horizontal plane parallel to the plane of major extension of the miter base 20 that includes the pivot point 50 may be used to describe inventive features of the present invention.

[0020] A handle 120 is attached to the motorized gearbox 110. The handle 120 may be otherwise attached so as to control the position of the rotary saw blade 80. A knob 122 or other grippable attachment at the end of the arm 124 of the handle 120 facilitates positioning of the saw blade. The handle arm 124 may be angled with respect to the rotary blade 80 and/or the gearbox 110 for ease of use and safety. An adjustable tilt and/or rotating feature may be incorporated into the handle design.

[0021] FIG. 2 illustrates an embodiment of the present invention in a resting state 100. In a resting state, the second supporting arm 60 may be tensioned to assume a particular angular position with respect to the first supporting arm 40. A stationary blade guard 90 protects the user from the top or rear of the blade 80.

[0022] FIG. 3 illustrates a frontal (or rear view) of an embodiment 200 of the miter saw of the present invention. The first supporting arm 40 is mounted to the miter base 20. Proximate to the top of the first supporting arm 40, the second supporting arm 60 is attached. A mounting structure 55 secures the rotary blade 80 and the motorized gearbox 110 to the second supporting arm 60. To reduce the risk of making contact with the item being cut, the motorized gearbox 110 may be of a generally cylindrical body having a thinned end 220 in proximity to the rotary point 70 of the rotary blade 80. To further reduce the risk of making contact during cutting, the motorized gearbox 110 may extend in a direction substantially perpendicular to the surface of the item being cut. FIG. 3 shows that the motorized gearbox may have a uniform body 110 and a thinned end 220 that may be curved, rectilinear, multiply angled (230), or otherwise suitably formed. As

examples, the uniform body 110 thickness (MAX) may be 3, 4, 5, 8, or more inches and the thinned end 220 thickness (MIN) may be 0.5, 1, 2, 3, or more inches.

[0023] FIG. 4 illustrates an embodiment 400 of a miter saw of the present invention with a safety guard mechanism and tensioning spring 440 shown. The safety guard 460 covers a portion of the cutting blade and acts as a shield to protect a user. The inner safety guard 450 and outer safety guard 460 are rotatably attached to the rotary point 70 and are rotatably positioned by a control mechanism. An exemplary embodiment of the safety guard control mechanism 410 includes two bars 420 and 430 pivotably joined. One end of the safety guard control mechanism 410 may be attached to the inner safety guard 450, while the other end may be attached to the first supporting arm 40. As the cutting blade 80 is moved into a cutting position, the safety guard exposes the blade to the item being cut. A tensioning spring 440 or other suitable mechanism may retract the second support arm 60 to a resting position. A vacuum hose may be attached to outlet 484 of pipe 480 for removal of wood chips and the like. Alternatively, the pipe may be made flexible and positioned such that debris is directed away from the miter base without the use of a vacuum.

[0024] The operation of an embodiment of the greater capacity cutting saw of the present invention is illustrated in FIGS. 5 and 6. FIG. 5 shows a side view of the miter saw cutting into a crown molding 500 and the top 510 of the motorized gearbox. FIG. 6 shows a perspective view of the same cutting action.

[0025] The performance of the greater capacity cutting saw of the present invention is shown in Table 1 in reference to the performance of a competitor device.

Characteristic	Present Invention	Existing Miter Saw
Vertical Capacity – Crown Molding Nested Vertically	7.75"	6.625"
Horizontal Capacity – Base Molding Lying Flat	9.25"	8"
Horizontal Capacity – Crown Molding Lying Flat	7.75"	6.5"
45 Degree Bevel Cut Capacity	2" x 10" left, 1" x 10" right, 2" x 8" with spacer	2" x 8" left and right
90 Degree Cross Cut Capacity	2" x 10"	2" x 8"
45 Degree Miter Cut Capacity	2" x 6", 4" x 4" with spacer	2" x 6" 4" x 4"

Table 1

[0026] It is believed that the present invention and many of its attendant advantages will be understood by the forgoing description. It is also believed that it will be apparent that various changes may be made in the form, construction and arrangement of the components thereof without departing from the scope and spirit of the invention or without sacrificing all of its material advantages. The form herein before described is merely an explanatory embodiment thereof. It is the intention of the following claims to encompass and include such changes.